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YEAR 2000 COMPUTING
CHALLENGE

Leadership and
Partnerships Result in
Limited Rollover
Disruptions

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Mr. Chairman, Ms. Chairwoman, and Members of the Subcommittees:

Thank you for inviting us to participate in today's hearing on the change of century rollover. According to the report of the President's Commission on Critical Infrastructure Protection, the United States—with close to half of all computer capacity and 60 percent of Internet assets—is the world's most advanced and most dependent user of information technology.¹ Moreover, America's infrastructures are a complex array of public and private enterprises with many interdependencies at all levels. As a result, the United States was particularly at risk that system failures resulting from the change of century rollover would have adverse consequences on the public.

At this time, federal, state, and local governments as well as key sectors report that they have successfully met the Year 2000 challenge. While Year 2000 failures have occurred—some significant but most considered minor—these entities report that almost all of these failures have been mitigated, either through the correction of systems or by the implementation of contingency actions. Accordingly, few Year 2000 failures have adversely affected the public. While the Year 2000 challenge is not yet over because some key business processes have not yet been fully executed and because other risky dates remain, the nation's success thus far is a very positive indicator that these hurdles will also be overcome. The leadership exhibited by the legislative and executive branches and the partnerships formed by a myriad of organizations were pivotal factors behind this success. Ensuring that the lessons learned in addressing the year 2000 are effectively used to improve information technology management is a key challenge now facing the federal government.

After providing brief background information, today I will discuss (1) the reporting structure established by the government to obtain information on Year 2000-related failures during the rollover period, (2) examples of Year 2000 errors and their resolution, and (3) lessons from the Year 2000 effort that can be carried forward to improve the management of information technology activities. Appendix I provides our objectives, scope, and methodology.

Background

Because of its urgent nature and the potentially devastating impact it could have had on critical government operations, in February 1997 we

¹*Critical Foundations: Protecting America's Infrastructures* (President's Commission on Critical Infrastructure Protection, October 1997).

designated the Year 2000 problem a high-risk area for the federal government.² Since that time, we have issued over 160 reports and testimony statements detailing specific findings and numerous recommendations related to the Year 2000 readiness of a wide range of federal agencies.³ We have also issued guidance to help organizations successfully address the issue.⁴

The public faced the risk that critical services provided by the government and the private sector could be disrupted by the change of century rollover. As we have previously testified, financial transactions could have been delayed, flights grounded, power lost, and national defense affected.⁵ Fortunately, as we testified before your Subcommittees in November 1999,⁶ at the urging of congressional leaders and others, the Office of Management and Budget (OMB) and federal agencies dramatically increased the amount of attention and oversight given to the Year 2000 issue.

Most importantly, on February 4, 1998, the President signed an executive order that established the President's Council on Year 2000 Conversion, chaired by an Assistant to the President and consisting of one representative from each of the executive departments and from other federal agencies as may be determined by the Chair. The Chair of the Council was tasked with the following Year 2000 roles: (1) overseeing the activities of agencies; (2) acting as chief spokesperson in national and international forums; (3) providing policy coordination of executive branch activities with state, local, and tribal governments; and (4) promoting appropriate federal roles with respect to private-sector activities. The council focused attention on the problem and provided a forum for high-level communication among leaders in government, the private sector, and the international community.

²*High-Risk Series: Information Management and Technology* (GAO/HR-97-9, February 1997).

³These publications can be obtained through GAO's World Wide Web page at www.gao.gov/y2kr.htm.

⁴*Year 2000 Computing Crisis: An Assessment Guide* (GAO/AIMD-10.1.14, issued as an exposure draft in February 1997 and in final form in September 1997); *Year 2000 Computing Crisis: Business Continuity and Contingency Planning* (GAO/AIMD-10.1.19, issued as an exposure draft in March 1998 and in final form in August 1998); *Year 2000 Computing Crisis: A Testing Guide* (GAO/AIMD-10.1.21, issued as an exposure draft in June 1998 and in final form in November 1998); and *Y2K Computing Challenge: Day One Planning and Operations Guide* (GAO/AIMD-10.1.22, issued as a discussion draft in September 1999 and in final form in October 1999).

⁵*Year 2000 Computing Crisis: Strong Leadership and Partnerships Needed to Mitigate Risk of Major Disruptions* (GAO/T-AIMD-98-262, August 13, 1998).

⁶*Year 2000 Computing Challenge: Noteworthy Improvements in Readiness But Vulnerabilities Remain* (GAO/T-AIMD-00-37, November 4, 1999).

Among the many initiatives undertaken by the government, which improved its own as well as the nation's preparedness, were the following:

- On March 26, 1999 OMB implemented our April 1998 recommendation that governmentwide priorities be set⁷ by issuing a memorandum to federal agencies designating lead agencies for the government's 42 high-impact programs (e.g., food stamps, Medicare, and federal electric power generation and delivery; OMB later added a 43rd high-impact program—the Department of Justice's National Crime Information Center.) For each program, the lead agency was charged with identifying to OMB the partners integral to program delivery; taking a leadership role in convening those partners; and assuring that each partner had an adequate Year 2000 plan and, if not, helping each partner without one.
- OMB clarified its contingency plan instructions and, along with the Chief Information Officers Council, adopted our business continuity and contingency planning guide for federal use. In addition, on May 13, 1999 OMB required agencies to submit high-level versions of these plans.
- Council officials participated in monthly, multistate conference calls with state Year 2000 coordinators. The latest of these calls occurred on January 3; 36 states participated and discussed the results of the century rollover. Moreover, in July 1998, March 1999, and October 1999, the Council—in partnership with the National Governors' Association—convened Year 2000 summits with state and U.S. territory Year 2000 coordinators.
- The Council established a nationwide campaign to promote "Y2K Community Conversations" to support and encourage the efforts of government officials, business leaders, and interested citizens to share information on their progress. To support this initiative, the Council developed a toolkit that provided examples of which sectors should be represented at these events, and issues that should be addressed.
- The Council established over 25 sector-based working groups and conducted outreach activities, likewise consistent with our April 1998 recommendation.⁸ Also consistent with an April 1998 recommendation, the Chair directed the Council's sector working groups to assess their

⁷Year 2000 Computing Crisis: Potential for Widespread Disruption Calls for Strong Leadership and Partnerships (GAO/AIMD-98-85, April 30, 1998).

⁸GAO/AIMD-98-85, April 30, 1998.

sectors. In 1999, the Council subsequently issued four public reports summarizing these assessments.

We testified before you in November 1999 that as a result of these efforts substantial progress had been made to reduce the risk posed by the Year 2000 problem.⁹

Information Coordination Center Established to Monitor and Assess Rollover Period

On June 14, 1999, the President created the Information Coordination Center (ICC) to assist the Chair of the President's Council on Year 2000 Conversion. The ICC was charged with making preparations for information-sharing and coordination within the federal government and key components of the public and private sectors, coordinating agency assessments of Year 2000 emergencies and, if necessary, assisting federal agencies and the Chair of the Council in reconstitution processes. Accordingly, under the umbrella of the ICC, the federal government implemented a large-scale reporting process to obtain information on events occurring during the rollover weekend from major federal agencies, states, key sectors, and foreign countries.

ICC Reporting Process Structured to Obtain Selected Status Information From Federal Agencies, State and Local Governments, Key Sectors, and Foreign Countries

To obtain information from a variety of sources, including federal agencies, states, localities, and key sectors, an ICC contractor developed an unclassified reporting system, the Information Collection and Reporting System (ICRS), which was used by these entities to provide status and incident information to the ICC and others. Reporting entities were to provide status information to ICRS through a series of organization-specific input screens. If an incident occurred during the reporting period, whether Year 2000-related or not, the reporting entity was responsible for determining whether the situation was still normal ("green" status), or whether the incident had resulted in reduced capacity, capability, or service ("yellow" status), or significantly reduced capacity ("red" status). The ICC directed all reporting entities to provide reports twice a day and/or whenever a significant change in status occurred between December 28, 1999, and January 7, 2000.

Each of the 24 major departments and agencies except for the Departments of Defense and State reported on their status during the rollover period using ICRS. Defense provided classified status information via a secured telecommunications line to the ICC's Sensitive Compartmented Information Facility. State provided the ICC with verbal reports and provided access to its Weathervane system in the Sensitive

⁹GAO/T-AIMD-00-37, November 4, 1999.

Compartmented Information Facility. The Weathervane system provided each embassy's assessment of the status of its foreign country.

The Federal Emergency Management Agency (FEMA) was the primary liaison for gathering information from state and local governments. FEMA used its 10 Regional Operation Centers—interim command and control sites that can be activated to monitor potential disasters such as hurricanes—to monitor the rollover to the year 2000. From December 28, 1999, through January 4, 2000, the Regional Operations Centers responsibilities included (1) reviewing states' ICRS status reports, (2) contacting states that did not submit reports and obtaining the state's status, (3) preparing and submitting regional ICRS status reports to FEMA headquarters, and (4) participating in daily teleconference calls with FEMA headquarters. If requested, the centers also sent representatives to their respective states' emergency operation centers for the rollover period to provide on-site monitoring of states' Year 2000 status, and help states request federal assistance if needed. FEMA headquarters was responsible for reviewing and assessing regional input and summarizing national-level information.

Individual states were responsible for designating a point of contact responsible for submitting ICRS reports and determining how local reports would be provided to the ICC. With respect to local reporting, states had the option of using their own reporting mechanism or obtaining and distributing ICRS passwords to localities that would allow them to submit ICRS status reports. According to the ICC, about 750 localities in 37 states and territories submitted ICRS status reports on or after January 1, 2000. States were also responsible for reviewing and assessing locality status information and entering state-level status information. In addition, states were to submit a separate report on the status of federally funded programs, such as food stamps and unemployment insurance.

To obtain status information from key sectors, six federal organizations also worked with private-sector organizations designated as National Information Centers to provide information to the ICC on critical sectors during the rollover period. For example, for the rollover period the Department of Energy implemented an emergency operations center that included representatives from the North American Electric Reliability Council, American Gas Association, American Petroleum Institute, and the Interstate Natural Gas Association of America—each a National Information Center. Along with the Department of Energy, these entities were charged with monitoring reports from the field and performing impact analyses. Both the Department of Energy and the North American Electric Reliability Council periodically submitted ICRS reports. The

Department of Energy reported on the status of its mission-critical systems, online computer systems, headquarters building infrastructure, field building structure, operational health/safety systems, federal electric power, electric power, oil, and gas areas. The North American Electric Reliability Council reported on the status of specific electric power organizations. Table 1 lists the sectors that had National Information Centers, responsible private-sector organizations, and lead federal organizations.

Table 1: National Information Centers

Sector	National Information Center Organization	Lead Federal Organization
Airlines	Air Transport Association	Department of Transportation
Cyber Assurance	Cyber Assurance National Information Center	Information Coordination Center
Electric Power	North American Electric Reliability Council	Department of Energy
Financial Services	Securities Industry Association	Securities and Exchange Commission
Natural Gas	American Gas Association	Department of Energy
Natural Gas	Interstate Natural Gas Association of America	Department of Energy
Oil	American Petroleum Institute	Department of Energy
Pharmaceuticals	National Pharmaceutical Alliance	Department of Health and Human Services
Pharmaceuticals	National Association of Chain Drug Stores	Department of Health and Human Services
Retail	National Retail Federation	Information Coordination Center
Telecommunications	Network Reliability and Interoperability Council	National Communications System

Source: ICC.

To obtain international information, the ICC relied on information provided by the Departments of State, Defense, and Transportation, the National Security Council, and the National Information Centers. In addition, the ICC obtained information from the International Y2K Cooperation Center's¹⁰ Global Status Watch system. This system, developed and operated by an ICC contractor, was used by foreign countries to post information, using a standard template, on the status of major infrastructure areas such as energy, telecommunications, water, and government services. Similar to the ICRS, this system called for

¹⁰The International Y2K Cooperation Center was created by the United Nations to promote strategic cooperation and action among governments, peoples, and the private sector to minimize adverse Year 2000 effects on the global society and economy.

countries to report on Year 2000- or non-Year 2000-related events and whether each sector was operating at normal capacity, reduced capacity or service, or significantly reduced capacity or service. During the rollover period, the Chair of the President's Council on Year 2000 Conversion also participated in telephone calls with other national Year 2000 coordinators.

ICC Gathered and Analyzed Status Information During the Rollover Period

To accomplish the goal of gathering, analyzing, and summarizing information on system operations, the ICC had a core administrative staff that was supplemented during the rollover period with officials detailed from federal agencies. During the rollover period of December 28, 1999, through January 7, 2000, the ICC was organized by sector, each headed by federal agency leads (see table 2).

Table 2: ICC Structure

Sector	Lead Federal Organization(s)
Cyber-assurance	ICC, Critical Infrastructure Assurance Office, the Federal Computer Incident Response Capability, and the National Infrastructure Protection Center
Financial services	Federal Reserve Board
Small business	Small Business Administration
Chemical related manufacturing	Environmental Protection Agency
Drinking water	Environmental Protection Agency
Hazardous materials	Environmental Protection Agency and the U.S. Coast Guard
Wastewater treatment	Environmental Protection Agency
Emergency services	FEMA
Mission-critical systems	Office of Management and Budget
Public safety	Department of Justice
State & local governments	FEMA
Tribal governments	Department of the Interior
Education	Department of Education
Employment-related protection	Department of Labor
Federal benefits payment programs	Social Security Administration
Food supply	Department of Agriculture
Health care	Department of Health and Human Services
High-impact federal programs	Office of Management and Budget

Sector	Lead Federal Organization(s)
State-administered federal programs	Office of Management and Budget
National security & international affairs	Departments of Commerce, Defense, and State
Building operations	General Services Administration
Energy	Department of Energy
Communications	Federal Communications Commission/General Services Administration
Transportation	Department of Transportation

Source: ICC.

Sector leads, and their supporting staff, were responsible for maintaining continuous understanding and current status information on their sector during the century rollover period. In performing these duties, they reviewed ICRS status reports, obtained relevant information from their respective organizations through telephone conversations, faxes, and e-mails, and reviewed media reports. Each sector also provided periodic summaries of its status. These summaries were used to provide status information to the Chair of the President's Council on Year 2000 Conversion as well as to the public.

Since ending full operations on January 7, the ICC discontinued ICRS reporting and directed federal agencies to report on their status daily via e-mail until January 31. The ICC plans to begin full operation again during the leap year rollover between February 28 and March 1.

ICRS Reporting Processes Generally Worked as Expected

On the basis of our observations, the ICRS reporting processes generally worked as expected. In particular, during the peak reporting times of December 31, 1999 through January 3, 2000, ICC officials and sector leads and supporting staff reviewed and assessed ICRS status reports as well as media reports. Where it was determined to be significant and relevant, they followed up on possible Year 2000-related incidents with their agencies and others. For example, the Small Business Administration representatives at the ICC obtained information from the agency's regional offices on problems being experienced by some small businesses. In some cases, agencies were able to determine that a reported problem was false. In another example, a Department of Health and Human Services representative at the ICC contacted the Food and Drug Administration about a problem with a hospital dispensing system that had been reported on an Internet site. The Food and Drug Administration investigated the reported problem and found it to be false.

Information gathered from these various sources at the ICC was intended to concentrate on events that were the result of system and operational disruptions or that might be impacted by such disruptions. Accordingly, not all Year 2000 incidents were expected to be reported and assessed. At the same time, the Director of the ICC stated that he encouraged entities to use the remarks section in the ICRS to elaborate on other important Year 2000-related incidents. However, he stated that organizations' use of the remarks section was "mixed"—some organizations provided a considerable amount of data on minor anomalies while others had no incidents or elected not to elaborate on any issues that they might have had.

With respect to key sectors, while private-sector representatives in the United States provided information to the ICC, it is not likely that all Year 2000-related errors were reported since the government could not mandate that all incidents be reported. Indeed, on January 3, 2000, the Chair of the President's Council on Year 2000 Conversion stated that "probably some of them [private companies] are having computer glitches and not reporting it to us." He added that if a business is having a minor problem that they were probably not reporting it.

Data limitations were particularly applicable in the international arena. On January 2, 2000, the Chair of the President's Council noted these limitations. He stated that U.S. embassies were not collecting data at the same level as in the United States, and that they did not have the same ability to check with all of the private-sector providers in other countries. The Chair characterized the Department of State's Weathervane system, which captured information from U.S. embassies, as a users' report on whether there were any problems with areas such as power and telecommunications. Moreover, the International Y2K Cooperation Center's Global Status Watch system reflects self-reported data and, as discussed earlier, concentrates on the reporting of problems that cause sectors to operate in a reduced capacity or service.

Reported Year-2000 Incidents Addressed Quickly and Had Little Effect on the Delivery of Key Services

Few Year 2000-related errors reported during the rollover affected the delivery of key services because they were reported to be corrected quickly and/or contingency plans were implemented. A key reason that Year 2000-related errors had little effect on business operations and the delivery of key services is that federal agencies and other organizations used the rollover weekend to identify and correct errors before the problem resulted in operational consequences.

In guidance on planning for the rollover period, called “day one” or “day zero” planning,¹¹ we stated that organizations should activate coordination/command center(s), conduct facility inspections, and perform post-rollover tests, evaluations, and assessments of key business processes and supporting systems. According to the Chair of the President’s Council, every emergency operating center in the federal government was operating on January 1, 2000, and agencies used the weekend to test their systems and operations. In addition, the Chair stated that organizations running critical services in the private sector were also staffed on January 1, 2000. For example, major banks and exchanges both in the United States and in foreign countries used the rollover weekend for final systems and interconnectivity testing in the year 2000 prior to opening for business.

The following are specific examples of how testing during the rollover weekend helped to identify and correct problems quickly.

- Shortly after the rollover to the year 2000, the General Services Administration and other agencies began checking federally owned and leased buildings to determine whether any Year 2000-related problems had occurred. As a result of these inspections, certain building operations—such as access control systems—were found to have malfunctioned and were corrected and/or contingency plans implemented.
- A “zero day” test of the DOE Oak Ridge facility’s Dynamic Special Nuclear Material Control and Accountability System—a system normally not operating during the weekend—found a Year 2000-related file transfer error. After the rollover, one segment of the software began generating file identifiers with a 4-digit year format, while the file transfer software was expecting a 2-digit year format. As a result, the test of the transfer failed. According to DOE, contingency plans that had been updated and tested because of the Year 2000 problem were implemented and magnetic tapes were used to successfully transfer the information and the Year 2000 failure was corrected a short time later.
- A foreign country reported to the International Y2K Cooperation Center’s Global Status Watch system on January 2, 2000, that “numerous tests [were] carried out in banking, administration, and industries. Only minor problems [were found], corrected on the spot.”

¹¹GAO/AIMD-10.1.22, October 1999.

Reported Year 2000-Related Errors in the Federal Government

Before the rollover period, we testified before you that the federal government's overall progress had been significant—from a low of compliant mission-critical systems of 19 percent in August 1997 to a reported 99 percent in October 1999.¹² We also testified that while not all actions were completed at that time, the government had made progress in addressing our recommendations related to the key areas of priority-setting, end-to-end testing, and business continuity and contingency plans.

The federal government's efforts have paid off. During the rollover period, most Year 2000-related errors reported by the federal government were minor and did not have an effect on operations or the delivery of services. Even those that were significant (those that resulted in degraded service or, if not corrected, would have resulted in degraded service) were mitigated by quick action to fix the problem or through the implementation of contingency plans. Among the most significant incidents were the following.

- On January 1, 2000, the Deputy Secretary of Defense reported that one of its satellite-based intelligence systems experienced a Year 2000 failure shortly after the rollover of Greenwich Mean Time; Defense was not able to process information from that system. According to the Deputy Secretary, the problem was with the ground processing station, not the satellite itself. The Deputy Secretary also stated that Defense adopted backup procedures, which resulted in its operating at less than its full peacetime level of activity but allowed it to continue to meet its high-priority needs. Defense reported that the satellite ground processing system was returned to full operational status on January 3, 2000.
- The Health Care Financing Administration's (HCFA) Medicare program, a high-impact program, was affected by Year 2000-related errors experienced by its business partners. For example, on January 3, HCFA was informed that a bank that handles electronic fund transfer transactions for six contractors to the Federal Reserve could not receive those transactions electronically. A temporary workaround was implemented which involved having the contractors send diskettes with the transactions to the bank via overnight mail until the bank fixed and tested the electronic communication software error on January 6, 2000. While this workaround allowed HCFA to make payments to providers within the required 30 days, payments were nevertheless delayed. Specifically, at least \$50 million in payments to Medicare Part A health care providers (e.g., hospitals and nursing facilities) were delayed 1-day.

¹²GAO/T-AIMD-00-37, November 4, 1999.

Medicare provider claims are being returned because claims have been submitted dated 1900 or 2099. Some Medicare data centers reported that they received claims from providers with these erroneous dates after the rollover. For example, according to HCFA officials, one contractor had received about 11,000 claims with these erroneous dates in the first two weeks of January. According to HCFA's Deputy Director of Information Services, most of these claims were traced to providers that had not upgraded their systems. The Medicare contractors have advised the providers to update their systems, and HCFA has instructed the data centers to return claims with erroneous dates.¹³

- The Federal Aviation Administration's (FAA) air traffic control system, another high-impact program, reported experiencing Year 2000-related systems problems. According to FAA, none affected safety, service, or capacity and some merely involved inaccurate date displays. In all cases, FAA reported that it was able to quickly fix the system or implement contingency plans that allowed operations to continue.

Two key FAA systems that had problems were the Low Level Wind Shear Alert System and a contractor-maintained Kavouras Graphic Weather Display System. In the case of the Low Level Wind Shear Alert System, the system displayed an error at eight sites¹⁴ following the rollover from 1999 to 2000 Greenwich Mean Time, and failed to operate. FAA field staff rebooted the systems, and the longest length of time that one of the systems took to return to normal operations was 2 hours and 12 minutes.¹⁵ Because the systems were not operational for this short period of time and because FAA does not operate backup systems, this problem could have affected aviation operations if weather conditions had been severe. In the case of the Kavouras Graphic Weather Display System, ten minutes after the Greenwich Mean Time rollover, the system began sending data showing the year as 2010. This resulted in the system rejecting weather data from the National Weather Service and failing to properly update data going to 13 Automated Flight Service Stations.¹⁶

¹³Before receiving this instruction from HCFA, the contractor that had received approximately 11,000 erroneous claims in the first two weeks of the year had electronically modified these claims. According to HCFA's Deputy Director of Information Services, HCFA directed this contractor to stop this practice because it was concerned about modifying claims information without the concurrence of the provider.

¹⁴Tampa FL, Denver CO, Atlanta GA, Orlando FL, Chicago IL, St. Louis MO, LaGuardia NY, and New Orleans LA.

¹⁵The length of time these systems were out of operation varied widely, ranging from 5 minutes at one site to 2 hours and 12 minutes at another site.

¹⁶Altoona PA, Leesburg VA, Millville NJ, Macon GA, Louisville KY, Columbia MO, Conroe TX, Elkins WV, Buffalo NY, Williamsport PA, McKeller TN, Gainesville FL, and Wichita KS.

Within 10 minutes, the contractor reloaded system software in order to restore the service and all systems were reported to be normal in about 2 hours.

Reported Year 2000-Related Errors in State and Local Government

As we previously testified,¹⁷ the Departments of Agriculture, Health and Human Services, and Labor took action to help states successfully transition the 10 high-impact state-administered federal programs into the year 2000.¹⁸ For example, the Department of Agriculture's Food and Nutrition Service obtained a contractor to conduct on-site visits to certain states and territories to provide technical assistance in areas such as software testing and contingency planning. The success of these efforts is demonstrated by the relatively minor Year 2000-related errors reported in these programs. In total, the Departments of Agriculture, Health and Human Services, and Labor reported that 11 states and territories had Year 2000 errors in one or more state-administered federal programs. These errors ranged from cosmetic printing or display problems to failures that resulted in minor disruptions of services. For example:

- Oregon had Year 2000-related errors in systems used for the Food Stamps, Child Support Enforcement, and Temporary Assistance for Needy Families programs. Regarding food stamps, the state's system for processing daily updates failed, creating a backlog of batch records. This problem was corrected by the installation of a new system on the next business day, and no impact on business operations was reported. The state's system that tracks data in numerous programs, including Child Support Enforcement and Temporary Assistance for Needy Families, had a Year 2000-related problem that was fixed by January 7, 2000. This problem resulted in a 1-day delay in payments to clients.
- Florida and Kentucky reported Year 2000-related problems with their unemployment benefits' automated telephone call processing system which would not allow claims to be processed for claimants filing claims on January 3, 2000, who had earnings in 1999. About 100 claimants were affected in Florida and fewer than 50 in Kentucky. Claimants were

¹⁷ *Year 2000 Computing Challenge: Readiness of Key State-Administered Federal Programs* (GAO/T-AIMD-00-9, October 6, 1999), *Year 2000 Computing Challenge: Federal Efforts to Ensure Continued Delivery of Key State-Administered Benefits* (GAO/T-AIMD-99-241, July 15, 1999), and *Year 2000 Computing Challenge: Delivery of Key Benefits Hinges on States' Achieving Compliance* (GAO/T-AIMD/GGD-99-221, June 23, 1999).

¹⁸ The 10 high-impact state-administered federal programs are the Department of Agriculture's Child Nutrition, Food Stamps, and Special Supplemental Nutrition Program for Women, Infants, and Children; the Department of Health and Human Services' Child Care, Child Support Enforcement, Child Welfare, Low Income Home Energy Assistance Program, Medicaid, and Temporary Assistance for Needy Families; and the Department of Labor's Unemployment Insurance.

instructed to complete and mail claims forms that had already been provided in advance. Florida reported correcting its system on January 4, while Kentucky reported fixing the problem on January 7.

- Guam reported it had successfully implemented contingency plans (i.e., manual processing) in the Food Stamps, Women, Infants, and Children, Medicaid, Temporary Assistance for Needy Families, Child Care, and Child Welfare programs. Such contingencies were necessary because the systems that supported these programs were not compliant and the replacement systems were not implemented before the century change.

In addition to state-administered federal human services programs, other state and local Year 2000-related errors were found. Examples include Year 2000-related problems with issuing drivers licenses for the wrong number of years and marriage license software registering the date as 1900 (both of these problems were reported as corrected). In another example, the Navajo Nation Law Enforcement Office reported that seven of its eight computer-aided dispatch system servers failed and a manual process was used until the servers were fixed. According to a Navajo Nation Law Enforcement Office information systems analyst, all of the servers were fixed by January 19, 2000.

Reported Infrastructure and Key Sector Year 2000-Related Errors

Essential to the transition to the year 2000 was the successful rollover of the organizations that manage the nation's infrastructure (i.e., energy, telecommunications, and water) and major sectors (e.g., banking and finance). Fortunately, there were no reported Year 2000-related errors in these sectors during the rollover period that affected their ability to continue providing these critical services. The leadership of the President's Council on Year 2000 Conversion and federal agencies which oversaw or created partnerships with major private-sector entities were essential to this success.

Many of the reported problems in the private sector related to the retail sector, including a retailer whose cash registers and other systems did not work until a software patch was installed, slot machines that did not work, and a small business that could not access its accounting information. Perhaps the most widespread Year 2000-related problem related to retail credit card processing. Credit card companies reported to financial regulators on January 6, 2000, that they had identified a Year 2000 failure resulting in over 470,000 duplicate transactions on charges generated after January 1, 2000. The problem was due to over 7,000 small merchants and mail-order businesses using a particular electronic credit card processing system that they had not upgraded although the vendor

stated that it had notified users in February 1999 that upgrades would be necessary. The merchants were notified of the problem and the credit card companies prohibited them from receiving settlement services until their systems had been upgraded.

According to an official at the Federal Reserve, credit card industry representatives participating in an industry-wide effort to resolve this issue reported that as of January 19, 2000, a small number of merchants remained to be contacted, and over 5,800 merchants have fixed their systems. On January 26, 2000, officials from two major credit card companies told us that the vast majority of the duplicate transactions had been corrected.

Another Year 2000 incident occurred in the Federal Reserve System, which is instrumental to our nation's economic well-being since it provides depository institutions and government agencies with services such as transferring funds and securities. On January 3, 2000, the Federal Reserve Bank of Chicago reported a Year 2000 failure involving the transmission of about \$700,000 in tax payments of 68 area banks to the Treasury's general account. Banks have various options for providing payment instructions to make tax payments to the Treasury using a voice response mechanism. However, an interface linking the Bank's voice response unit with the Treasury Tax and Loan system did not operate properly during the rollover period and it was unable to transfer tax payments totaling nearly \$700,000 to the Treasury for banks that had used the voice response system (the Federal Reserve Bank of Chicago processed about \$5 billion in tax payments that day). The problem was corrected overnight and the tax payments were processed the next day with an as of date of January 3.

Reported International Year 2000-Related Errors

The President's Council on Year 2000 Conversion launched several initiatives in the international arena to address Year 2000 readiness in foreign countries. In particular, the Chair of the President's Council attended National Y2K Coordinators' meetings hosted by the United Nations and is a member of the Steering Committee of the International Y2K Cooperation Center. Further, as we testified on October 21, through its leadership of the President's Council's International Relations Working Group, the Department of State had worked to increase awareness of the Year 2000 problem throughout the world, collected and shared

information on the problem with other federal agencies and foreign nations, and encouraged the remediation of faulty computer systems.¹⁹

Several foreign countries reported Year 2000-related errors to the International Y2K Cooperation Center's Global Status Watch system, but none were reported to have resulted in reduced capacity, capability, or service. For example:

- On January 5, 2000 Grenada reported that a compliant version of the computer systems for their customs services would not be installed until January 30, 2000 but that a manual backup system was "just as efficient."
- On January 6, 2000, Kazakhstan reported that a technology process at a power station had been handled manually since January 1, 2000, because noncompliant systems had not been replaced due to a lack of funds. According to the report, "manual handling causes certain difficulties, since at every power unit there are 250 devices to be controlled."
- On January 12, 2000, the Sudan reported that the interbank communications between two banks was delayed by 2 days due to a Year 2000 problem in the communications software. This problem was reported as fixed.

Other Year 2000-related errors were also found. For example, in the United Kingdom before the change of century, retailers had problems with credit card readers that looked 4-days ahead. According to the United Kingdom's government millennium center, this problem affected about 5 percent of terminals supplied by banks to process credit and debit card transactions. The problem was reported to have been largely resolved by the morning of December 30.

A variety of biomedical devices had Year 2000-related errors in foreign countries but none were reported to affect patient safety. For example, Sri Lanka reported that a hospital found that two blood gas analyzers were noncompliant. However, Sri Lanka reported that the problem had no significant effect on the clinical tests being carried out by the analyzers. Another hospital in Sri Lanka found that a E.C.G. Monitoring Unit was not compliant and that it could not be used.

¹⁹Year 2000 Computing Challenge: State and USAID Need to Strengthen Business Continuity Planning (GAO/T-AIMD-00-25, October 21, 1999).

Lessons Learned From the Government's Year 2000 Efforts Can Be Used to Improve Management of Information Technology

For many federal agencies, the threat posed by the Year 2000 problem was a much-needed wake-up call. Because of the urgency of the issue, agencies could not afford to carry on in the same manner that had resulted in over a decade of poor information technology planning and program management. As we reported in October 1999, the Year 2000 problem has laid a foundation for longer term improvements in the way the federal government views, manages, and protects computer systems supporting the nation's critical infrastructure.²⁰ Among the lessons learned were the importance of

- providing high-level congressional and executive branch leadership,
- understanding the importance of computer-supported operations,
- providing standard guidance,
- establishing partnerships,
- facilitating progress and monitoring performance, and
- implementing fundamental information technology improvements.

A recent report issued jointly by the Intergovernmental Advisory Board²¹ and the General Services Administration provides information on similar experiences from federal agencies, states, local governments, and foreign countries.²²

Providing High-level Congressional and Executive Branch Leadership

One of the most important factors in prompting attention and action on the Year 2000 problem has been proactive leadership at the highest levels of government. In particular, congressional oversight played a central role in addressing the Year 2000 challenge. For example, congressional hearings on agency-specific, national, governmentwide, and international Year 2000 problems exposed the threat that this problem posed to the public. In addition, the President's Council on Year 2000 Conversion provided strong, effective leadership, focusing attention on the problem

²⁰*Critical Infrastructure Protection: Comprehensive Strategy Can Draw on Year 2000 Experiences* (GAO/AIMD-00-1, October 1, 1999).

²¹The Intergovernmental Advisory Board was established to bridge the gap between federal, state, and local governments and to educate information technology professionals nationwide on finding solutions to intergovernmental challenges.

²²*The Many Silver Linings Of The Year 2000 Challenges* (Intergovernmental Advisory Board in cooperation with the General Services Administration, January 2000).

and providing a forum for high-level communication and partnerships among leaders in the government, the private sector, and the international community.

In the *Silver Linings* report, Georgia reported similar experiences with the effectiveness of executive branch leadership and legislative oversight. Georgia's Chief Information Officer reported that the principal direction for the state's Year 2000 program was set by the governor. Further, Georgia created a Y2K Executive Oversight Committee comprised of members of the state legislature and representatives from the state's executive branch that provided oversight and support.

Understanding the Importance of Computer-Supported Operations

According to officials involved in conversion efforts, the Year 2000 challenge served as notice to many who were previously unaware of our nation's extensive dependence on computers. For example, the Secretary of Transportation stated that the Year 2000 issue had caused the department to become more enlightened about the importance of technology in its ability to deliver services, and that prior to the Year 2000 issue, he did not fully recognize the degree to which technology was being used in the transportation sector.

The *Silver Linings* report also highlighted benefits in this area. For example, Michigan reported that it had to focus on its core business processes and how they work, which it believes will be useful in identifying opportunities for information technology to play a pivotal role in transforming business practices. The Commonwealth of Virginia reported that one area it can capitalize on to improve its use and management of information technology is the extent to which such technology has permeated agency operations, and the attendant operational risks such dependencies entail.

In addition, the telecommunications sector stated that due to the Year 2000 problem, management now fully understands its dependence on technology and the importance of good engineering practice, process, and continuity. Similarly, the pharmaceutical industry reported that that it had spent a great deal of resources understanding every aspect of its downstream distribution system.

Providing Standard Guidance

Standard guidance that was universally accepted, adopted, and implemented facilitated Year 2000 conversion efforts and related oversight. In particular, guidance issued by OMB, the Chief Information Officers Council, and by us (1) provided a level of consistency across government by providing standard terms, tools, and techniques based on

best practices, (2) imposed structure and discipline, (3) increased the rigor of testing and assessment efforts, (4) promoted consistency in data gathering and reporting, and (5) facilitated evaluation of actions by both agency management and auditors. In the *Silver Linings* report, Michigan noted that it developed a consistent methodology for managing large information technology projects that it can carry forward.

Establishing Partnerships

To address the Year 2000 problem from a national perspective, the President's Council on Year 2000 Conversion and federal agencies established partnerships with several private-sector organizations, such as the North American Electric Reliability Council, to gather information critical to the nation's Year 2000 efforts and to address issues such as contingency planning. The Department of Energy reported that this private/public partnership was a benefit of the Year 2000 problem.

Other types of partnerships were also formed to address the Year 2000 issue, partnerships that should serve the nation well in the future. Several organizations reported to the President's Council on Year 2000 Conversion on the benefits of such partnerships. For example,

- The telecommunications industry reported that industries came together to support a common national interest.
- The oil industry reported that U.S. oil companies formed informal partnerships with associations in other countries.

In the *Silver Linings* report, Tennessee reported that the Year 2000 challenge encouraged all parties, especially in the government arena, to work together.

Facilitating Progress and Monitoring Performance

Both the executive branch and the Congress used techniques to facilitate and monitor performance in addressing Year 2000 conversion activities. During 1997, OMB instituted a quarterly reporting routine to facilitate monitoring of agency progress in making their critical systems compliant. In addition, many congressional committees actively monitored progress by holding hearings to obtain information on the Year 2000 readiness of federal agencies, states, localities, and other important nonfederal entities, such as the securities industry.

The development of project metrics to monitor progress internal to the organization was also a useful tool that was often developed in response to the Year 2000 challenge. In the *Silver Linings* report, agencies and states cited the following.

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- The Department of Housing and Urban Development reported that it developed a system to track progress and view interdependent relationships between information development efforts.
 - The U.S. Customs Service reported that it developed a master schedule that was the foundation for measuring project progress.
 - Michigan reported that it determined the need to develop a comprehensive project reporting system.
 - North Carolina reported that statewide project planning and analysis as well as statewide project management and status reporting were Year 2000 activities that set the groundwork for a new, more efficient direction in enterprise management and business integration.

Implementing Fundamental Information Technology Improvements

The Year 2000 challenge resulted in many agencies' taking charge of their information technology resources in much more active ways than they have in the past, and provided them with the incentive and opportunity to assume control of their information technology environment. In many instances, it forced agencies to inventory their information systems, link those systems to agency core business processes, and jettison systems of marginal value. Also, agencies focused on their relationships with business partners critical to the delivery of services, especially for the government's 43 high impact programs. Moreover, agencies' development of business continuity and contingency plans should also help in the future in the event that an emergency occurs that negatively effects an agency's ability to perform services electronically.

The Year 2000 problem has also prompted some agencies to establish much-needed information technology policies in areas such as configuration management, risk management, and software testing. In addition, Year 2000 efforts have reinforced an understanding of the importance of consistent and persistent top management attention, which is essential to solving any intractable problem. According to officials at OMB, the Year 2000 problem also gave agency Chief Information Officers a "crash course" in how to accomplish projects. Many Chief Information Officers were relatively new in their positions and expediting Year 2000 efforts required many of them to quickly gain an understanding of their agency's systems, work extensively with agency program managers and Chief Financial Officers, and become familiar with budgeting and financial management practices.

Many of these same critical information management technology practices were also cited as improvements in the *Silver Linings* report.

For example, (1) Georgia reported that new testing standards were initiated to meet critical Year 2000 deadlines, (2) Michigan reported that lessons learned for the future included the development of a formal risk analysis and comprehensive quality assurance program, and (3) Howard County, Maryland, reported that its Year 2000 projects required a complete inventory and assessment of technology resources used throughout county government.

While the end of the Year 2000 challenge is in sight, it is crucial that organizations not lose the momentum that they have established in conquering this issue. These organizations must remain vigilant in identifying and reporting Year 2000-related incidents. Moreover, it is important that the government and individual organizations institutionalize the processes that they have established to contend with the Year 2000 problem so that future information technology initiatives can benefit from this undertaking and the valuable long-term lessons it has spawned.

Mr. Chairman, Ms. Chairwoman, this concludes my statement. I would be pleased to respond to any questions that you or other members of the Subcommittees may have at this time.

Contacts

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Objectives, Scope, and Methodology

The objectives of our review were to assess and report on (1) the response of the ICC and key federal agencies during the century rollover period, and (2) the nature and extent of Y2K-induced disruptions that occurred during the rollover period. In addition, as requested, we reported on lessons learned by the government and others while correcting their Year 2000 problems.

To meet these objectives, we placed observers at the ICC, key federal organizations (see table 3), the 10 FEMA Regional Operations Centers, and the District of Columbia during the rollover weekend.

Table 3: Federal Organizations Where GAO Observed Rollover Activity

Federal Organization

Information Coordination Center

FEMA

Federal Aviation Administration

Social Security Administration

Department of Energy

Department of Health and Human Services

HCFA

Federal Communications Commission

Federal Reserve System

Department of State

Department of Defense

U.S. Postal Service

As part of observing the rollover, we obtained and reviewed agency day one strategies, reviewed ICRS and incident reports, and discussed issues with appropriate personnel, including the Director of the ICC. We also reviewed key ICC documentation, such as the ICC Operations Guide. In addition, we received comments from the Director of the ICC on a draft of this testimony. The Director of the ICC stated that he generally agreed with the facts in the statement and provided some technical corrections which we incorporated.

Appendix I
Objectives, Scope, and Methodology

We performed our work between December 1999 and mid-January 2000 in accordance with generally accepted government auditing standards.

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